

Claims:

1. An adhesive composition comprising:  
a blend functionalized with a functional group, wherein the blend  
comprises a C3 to C40 olefin polymer and at least one additive, wherein  
the C3 to C40 olefin polymer comprises at least 50 mol% of one or more  
C3 to C40 olefins and has:
  - a) a Dot T-Peel of 1 Newton or more on Kraft paper;
  - b) an Mw of 10,000 to 100,000; and
  - c) a branching index ( $g'$ ) of 0.98 or less measured at the Mz of  
the polymer when the polymer has an Mw of 10,000 to  
60,000, or
  - d) a branching index ( $g'$ ) of 0.95 or less measured at the Mz of  
the polymer when the polymer has an Mw of 10,000 to  
100,000.
2. The adhesive composition of claim 1, wherein prior to blend  
functionalization, the C3 to C40 olefin polymer has:
  - a) a Dot T-Peel of 1 Newton or more on Kraft paper;
  - b) a branching index ( $g'$ ) of 0.98 or less measured at the Mz of  
the polymer;
  - c) a Mw of 10,000 to 60,000; and
  - d) a heat of fusion of 1 to 50 J/g.
- 25 3. The adhesive composition of claim 1, wherein prior to blend  
functionalization, the C3 to C40 olefin polymer is a homopolypropylene or a  
copolymer of propylene and up to 5 mole% ethylene having:
  - a) an isotactic run length of 1 to 30,
  - b) a percent of r dyad of greater than 20%, and
  - 30 c) a heat of fusion of between 1 and 70 J/g.

4. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer comprises propylene and less than 15 mole % of ethylene.
5. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer has a melt viscosity of 7000 Pa•sec or less at 190°C.
6. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer has a melt viscosity of 10 5000 mPa•sec or less at 190°C.
7. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer has a melt viscosity of 15 between 250 and 6000 mPa•sec at 190°C.
8. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer has a melt viscosity of 20 between 500 and 3000 mPa•sec at 190°C.
9. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer has a Tg of 0°C or less.
10. The adhesive composition of claim 1, wherein prior to blend 25 functionalization, the C3 to C40 olefin polymer has a Tg of -10°C or less.
11. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer has an Mw of 10,000 to 30 75,000 and a branching index of 0.6 or less.

12. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer has an Mw of 10,000 to 50,000 and a branching index of 0.7 or less.
- 5 13. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer has an Mw of 10,000 to 30,000 and a branching index of 0.98 or less.
- 10 14. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer has a branching index (g') of 0.90 or less measured at the Mz of the polymer.
- 15 15. The adhesive composition of claim 1, wherein prior to blend functionalization, the SEC graph of the C3 to C40 olefin polymer is bi- or multi-modal.
16. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer has an amorphous content of at least 50%.
- 20 17. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer has:
  - a) a peak melting point between 60 and 190°C;
  - b) a heat of fusion of 0 to 70 J/g; and
  - c) a melt viscosity of 8000 mPa•sec or less at 190°C.
- 25 18. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer has:
  - a) a Tg of -10°C or less;
  - b) a melt viscosity between 2000 and 6000 mPa•sec;
  - c) a molecular weight distribution (Mw/Mn) of at least 5; and
  - d) a bi- or multi-modal SEC graph of the polymer.
- 30

19. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer has a crystallinity of at least 5%.

5

20. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer has 20 wt% or more of hexane room temperature soluble fraction and 50 wt % or less of Soxhlet heptane insolubles.

10

21. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer comprises less than 3.0 mole % ethylene.

15

22. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer comprises less than 1.0 mole % ethylene.

20

23. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer has an Mz/Mn of 2 to 200.

24. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer has an Mz of 15,000 to 500,000.

25

25. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer has a SAFT of 50 to 150°C.

30

26. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer has a Shore A hardness of 95 or less.

27. The adhesive composition of claim 1, wherein prior to blend functionalization, the C3 to C40 olefin polymer has an Mw/Mn of 2 to 75.
- 5 28. The adhesive composition of claim 1, wherein the at least one additive includes a tackifier, a filler, an antioxidant, an adjuvant, an adhesion promoter, an oil, a plasticizer, a block, an antiblock, a pigment, a processing aid, a UV stabilizer, a neutralizer, a lubricant, a surfactant, a nucleating agent, a coupling agent, a color master batch, a polymer having a Mn below 5000, a functionalized wax, a polar wax, a non-polar wax, a polypropylene wax, a polyethylene wax, a wax modifier, an elastomer, an impact copolymer, an ester polymer, a crosslinking agent, a hydrocarbon resin, a diolefin, or a combination thereof.
- 10
- 15 29. The adhesive composition of claim 28, wherein prior to functionalization, the blend comprises about 0.1 to about 50 wt% of the at least one additive.
- 20
30. The adhesive composition of claim 29 wherein the additive comprises one or more tackifiers.
31. The adhesive composition of claim 30 wherein the tackifier is present at 5 to 50 weight %.
- 25
32. The adhesive composition of claim 1, wherein prior to blend functionalization, the blend further comprises an olefin homopolymer that is not functionalized.
33. The adhesive composition of claim 1, wherein prior to blend functionalization, the blend further comprises an olefin copolymer that is not functionalized.
- 30

34 The adhesive composition of claim 1, having a set time of 5 seconds or less.

35. The adhesive composition of claim 1, wherein the unsaturated compound units are present within the functionalized blend at from 0.1 to 50 wt%.

5 36. The adhesive composition of claim 1, wherein the blend is functionalized with a functional group utilizing radical copolymerization, and wherein the unsaturated compound is an unsaturated carboxylic acids, an ester of the unsaturated carboxylic acids, an acid anhydrides, a di-ester, a salt of an unsaturated carboxylic acid, an unsaturated amide, an unsaturated imide, an aromatic vinyl compound, a hydrolyzable unsaturated silane compound, an unsaturated halogenated hydrocarbon, or a combination thereof.

10

15 37. The adhesive composition of claim 1, wherein the blend is functionalized with a functional group utilizing radical copolymerization, and wherein the unsaturated compound is maleic anhydride, citraconic anhydride, 2-methyl maleic anhydride, 2-chloromaleic anhydride, 2,3-dimethylmaleic anhydride, bicyclo[2.2.1]-5-heptene-2,3-dicarboxylic anhydride , 4-methyl-4-cyclohexene-1,2-dicarboxylic anhydride, acrylic acid,

20 methacrylic acid, maleic acid, fumaric acid, itaconic acid, citraconic acid, mesaconic acid, crotonic acid, bicyclo(2.2.2)oct-5-ene-2,3-dicarboxylic acid anhydride, 1,2,3,4,5,&g, lo-octahydronaphthalene-2,3-dicarboxylic acid anhydride, 2-oxa-1,3-diketospiro(4.4)non-7-ene, bicyclo(2.2.1)hept- 5-ene-2,3- dicarboxylic acid anhydride, maleopimamic acid, tetrahydrophthalic anhydride, norborn-5-ene-2,3-dicarboxylic acid anhydride, nadic anhydride, methyl nadic anhydride, himic anhydride, methyl himic anhydride, x-methyl-bicyclo(2.2.1)hept-5-ene-2,3- dicarboxylic acid anhydride (XMNA), methyl acrylate, ethyl acrylate, butyl acrylate, methyl methacrylate, ethyl methacrylate, butyl methacrylate, vinyltrichlorosilane, vinyltris(beta-methoxyethoxy)silane, vinyltriethoxysilane, vinyltrimethoxysilane, gamma-methacryloxypropyltrimethoxysilane

25

30

monovinylsilane, monoallylsilane, vinyl chloride, vinylidene chloride, or a combination thereof.

38. The adhesive composition of claim 1, wherein the blend is functionalized with a functional group utilizing radical copolymerization, a peroxide, and wherein the unsaturated compound is maleic anhydride.  
5
39. The adhesive composition of claim 1, wherein the blend is functionalized with a functional group utilizing a solvent based functionalization process.  
10
40. The adhesive composition of claim 1, wherein the blend is functionalized with a functional group utilizing a melt based functionalization process without solvent.
- 15 41. The adhesive composition of claim 1, wherein the blend is functionalized using selective oxidation, ozonolysis, epoxidation, or a combination thereof.
- 20 42. A process of making the adhesive composition of claim 1, comprising providing the blend, and functionalizing the blend with a functional group.
43. The process of claim 42, wherein the blend comprises a tackifier, and the unsaturated compound is maleic anhydride.
- 25 44. The adhesive of claim 1 wherein the unsaturated compound is maleic anhydride.